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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/635,968	08/10/2000	Dan Botez	032026-0471	6270

7590 11/20/2001

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EXAMINER	
HARMON, CECIL B	
ART UNIT	PAPER NUMBER
2881	

DATE MAILED: 11/20/2001

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/635,968	BOTEZ ET AL.
	Examiner	**Art Unit**
	Cecil B. Harmon	2881

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-43 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-43 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____ .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claim1-12, 13-26 and 27-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Botez et al. **(5727013).**

3. In regards to claim 1, **Botez et al.** disclose in Figs. 8-14**,** a surface emitting semiconductor laser **Fig. [10, 60]** which comprises (a) a semiconductor substrate **70** an active region **61** at which light emission occurs, upper and lower cladding layers **32 and 33** surrounding the active region layer **61**, upper and lower edge faces **72 and 75**; an edge face **72** which has high reflectivity and the other face **75** with low reflectivity; electrodes **68 and 74** by which voltage can be applied across the substrate **70**. (b) A distributed feedback grating **col. 2, lines 46-59** incorporated with the structure which comprises periodic alternating grating elements **col. 2, lines 46-59** to provide optical feedback as a second order grating **col. 2, lines 46-59** for a selected effective wavelength **col. 8, lines 9-17** of light generated from the active region **61**. The grating has a selected phase shift **col.2, lines 11-21** with respect to the high reflectivity edge

face **72** and positioned to act upon the light that is generated in the active region **61** which produces a lasing action of light emission from at least one of the upper and lower faces **72 and 75** of the semiconductor laser.

4. In regards to claim 2, **Botez et** al disclose that the grating is formed of alternating reflective and transmissive elements **79 and 81**.

5. In regards to claim 3, **Botez et** al disclose that the reflective grating elements are formed of gold. **See col. 7, lines 53-68**

6. In regards to claim 4, **Botez et** al disclose that the gold **(Au)** elements in the grating is separated by air. **See col. 7, lines 53-68**.

7. In regards to claim 5, **Botez et** al disclose that the semiconductor laser includes means **63 and 62** for confining the current from the electrodes **71 and 74** to a stripe region **76**.

8. In regards to claim 6, **Botez et** al disclose that the electrodes **68 and 74** are formed on the upper **72** and lower **75** faces of the semiconductor laser and the upper electrode **68** is formed on the cap layer **68** to define an active stripe width **col. 7, lines 53-67 and col. 8, lines 1-10** in the active region layer **61** at which light emission occurs.

9. In regards to claim 7, **Botez et** al disclose that the active region layer **61** is formed of InGaAsP confinement layers at least one InGaAs quantum well **61** layer between the InGaAsP confinement layers and the lower and upper cladding layers are formed of n-type InGaP and p-type InGaP respectively and the substrate is formed of GaAs. **S e col. 8, lines 40-55**

10. In regards to claim 8, **Botez et** al disclose that the active region **61** has multiple quantum wells defined by layers of InGaAs separated by InGaAsP confinement layers. **See col. 7, lines 19-33.**

11. In regards to claim 9, **Botez et** al disclose the semiconductor laser **90** includes a cap layer **68** of p-type GaAs over the upper cladding layer wherein the grating **Fig. [9, 47]** is formed on the cap layer **68**.

12. In regards to claim 10, Botez et al does not teach that one of the edge face has fully reflective coating thereon and the other edge face has an antireflective coating thereon. Edge emitters are well known in the art to have one end face highly reflectively coated and the other end face coated with antireflective material to separate the weaker laser beam from the stronger beam that are emitted in the vertical direction.

13. In regards to claim 11, **Botez et** al disclose that the spacing between the highly reflective edge face **72** and the adjacent metal grating element correspond to a grating phase shift value in the range of 10-80 degrees. **See col. 5, lines 1-8.**

14. In regards to claim 12, **Botez et** al disclose that the one of the electrodes is formed on the lower face **75** and has a window opening formed therein to permit light emission therethrough. **Col. 8, lines 59-68.**

15. In regards to claim 13, **Botez et al.** disclose in **Figs. 8-14,** a surface emitting semiconductor laser **Fig. [10, 60]** which comprises (a) a semiconductor substrate **70** an structure on the substrate **70** including a layer with an active region **61** at which light emission occurs, upper and lower cladding layers **32 and 33** surrounding the active region layer **61**, upper and lower edge faces **72 and 75**; an edge face **72** which has high

reflectivity and the other face **75** with low reflectivity; electrodes **68 and 74** by which voltage can be applied across the substrate **70**. (b) A distributed feedback grating **col. 2, lines 46-59** incorporated with the structure which comprises periodic alternating grating elements **col. 2, lines 46-59** to provide optical feedback as a second order grating **col. 2, lines 46-59** for a selected effective wavelength **col. 8, lines 9-17** of light generated from the active region **61**. The grating has spacing between adjacent grating elements at a position intermediate to the edge faces that corresponds to a selected phase shift in the grating, and positioned to act upon the light that is generated in the active region **61** to produce a lasing action of light emission from at least one of the upper and lower faces **72 and 75** of the semiconductor laser.

16. In regards to claim 14, **Botez et al** disclose that the grating is formed of alternating reflective elements and transmissive elements. **See claim 2.**

17. In regards to claim 15, **Botez et al** disclose that the reflective grating elements are formed of gold. **See claim 3.**

18. In regards to claim 16, **Botez et al** disclose that the gold elements in the grating are separated by air. **See claim 4.**

19. In regards to claim 17, **Botez et al** disclose that the semiconductor laser includes a means for confining the current from the electrodes to a stripe region. **See claim 5.**

20. In regards to claim 18, **Botez et al** disclose that the electrodes are formed on the upper and lower faces of the semiconductor laser and the upper electrode is formed on a cap layer to define an active stripe width in the active region layer at which light emission occurs. **S e claim 6.**

21. In regards to claim 19, **Botez et al** disclose that the active region layer is formed of InGaAs confinement layers and at least one InGaAs quantum well layer between the InGaAsP confinement layers, and the lower and upper cladding layer are formed of n-type InGaP and P-type InGap respectively, and the substrate is formed of GaAs. **See claim 7.**

22. In regards to claim 20, that the active region layer has multiple quantum wells defined by layers of InGaAs separated by InGaAsP confinement layers. **See claim 8**.

21. In regards to claim 21, that the semiconductor layer includes a cap layer of p-type GaAs over the upper cladding layer and such that the grating is formed on the cap layer. **See claim 9.**

23. In regards to claim 22, Botez et al does not teach that one of the edge faces is fully reflectively coated and the other edge face has an antifeflective coating thereon. Edge emitters are well known in the art to have one end face highly reflectively coated and the other end face coated with antireflective material to separate the weaker laser beam from the stronger beam that are emitted in the vertical direction.

24. In regards to claim 23, Botez et al disclose that the spacing between adjacent grating elements is in the middle of the grating. **See col. 3, lines 4-14.**

25. In regards to claim 24, **Botez et al** disclose that the spacing in the grating corresponds to a grating phase shift of about 180 degrees. **See col. 5, lines 1-8.**

26. In regards to claim 25, **Botez et al** disclose that one of the electrodes is formed on the lower face **75** and has a window opening formed which permits the passage of light. **s col. 8, lin s 59-68.**

27. In regards to claim 26, **Botez et al** disclose that the spacing in the grating corresponds to a grating phase shift of about 180 degrees. **See col. 5, lines 1-8.**

28. In regards to claim 27, **Botez et al.** disclose in Figs. 8-14, a surface emitting semiconductor laser **Fig. [10, 60]** which comprises (a) a semiconductor substrate **70** a structure on the substrate, an active region **61** at which light emission occurs, upper and lower cladding layers **32 and 33** surrounding the active region layer **61**, upper and lower edge faces **72 and 75**; an edge face **72** and electrodes **68 and 74** by which voltage can be applied across the structure and substrate **70**. (b) A distributed feedback grating **col. 2, lines 46-59** incorporated with the structure which comprises periodic alternating grating elements **col. 2, lines 46-59** to provide optical feedback as a second order grating **col. 2, lines 46-59** for a selected effective wavelength **col. 8, lines 9-17** of light generated from the active region **61**. The grating has spacing between adjacent grating elements at position intermediate to the edge faces that corresponds to a selected phase shift in the grating **col.2, lines 11-21** and positioned to act upon the light that is generated in the active region **61** to produce lasing action of light emission from at least one of the upper and lower faces **72 and 75** of the semiconductor laser. (c) passive distributed Bragg reflector grating to reflect light back to the distributed feedback grating.

29. In regards to claim 28, **Botez et al** disclose that the grating is formed of alternating reflective and transmissive elements **79 and 81**.

30. In regards to claim 29, **Botez et al** disclose that the reflective grating elements are formed of gold. **Se col. 7, lin s 53-68**

31. In regards to claim 30, **Botez t al** disclose that the gold **(Au)** elements in the grating is separated by air. **See col. 7, lines 53-68**.

32. In regards to claim 31, **Botez et al** disclose that the semiconductor laser includes means **63 and 62** for confining the current from the electrodes **71 and 74** to a stripe region **76**.

33. In regards to claim 32, **Botez et al** disclose that the electrodes **68 and 74** are formed on the upper **72** and lower **75** faces of the semiconductor laser and the upper electrode **68** is formed on the cap layer **68** to define an active stripe width **col. 7, lines 53-67 and col. 8, lines 1-10** in the active region layer **61** at which light emission occurs.

34. In regards to claim 33, **Botez et al** disclose that the active region layer **61** is formed of InGaAsP confinement layers and at least one n-GaAs quantum well layer **61** between the InGaAsP confinement layers and the lower and upper cladding layers **65 and 67** are formed of n-type InGaP and p-type InGaP respectively and the substrate **70** is formed of GaAs.

35. In regards to claim 34, **Botez et al** disclose that the active region layer **61** has multiple quantum wells defined by layers of InGaAs separated by InGaAsP confinement layers. **See col. 7, lines 19-33.**

36. In regards to claim 35, **Botez et** al disclose the semiconductor laser **90** includes a cap layer **68** of p-type GaAs over the upper cladding layer wherein the grating **Fig. [9, 47]** is formed on the cap layer **68**.

37. In regards to claim 36, **Botez et al** does not teach that the edge faces are formed to be antireflective. It would have been obvious matter of design choice to make the

edge faces antireflective since applicant has not disclosed that by providing antireflective material on both end facet will solve a stated problem or for a particular purpose.

38. In regards to claim 37, Botez et al disclose that the spacing is in the middle of the grating. **See col. 3, lines 4-14.**

39. In regards to claims 38 and 43, **Botez et al** disclose that the spacing in the grating corresponds to a grating phase shift of about 180 degrees.

See col. 5, lines 1-7

40. In regards to claim 39, **Botez et al** disclose that the distributed Bragg reflector gratings are first order gratings. **See col. 2, lines 21-33.**

41. In regards to claim 40, **Botez et al** disclose that the distributed Bragg reflector gratings are second order gratings. **See col. 2, lines 46-59**

42. In regards to claim 41, Botez et al disclose that the semiconductor laser includes an insulating layer over the distributed Bragg reflector gratings to inhibit current flow through these grating. **See col. 9, lines 1-10**

43. In regards to claim 42, **Botez et al** disclose that one of the electrodes is formed on the lower face **75** and has a window opening formed therein to permit light emission therethrough. **See col. 8, lines 59-68.**

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cecil B. Harmon whose telephone number is 703-306-0247. The examiner can normally be reached on 8am-4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Dzierzynski can be reached on 703-308-4782. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-0956 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

CBH
November 9, 2001

James W. Davie
Primary Examiner